Offshore Renewable Energy Feasibility Study for the Gulf of Mexico

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Information Transfer Meeting
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Other BOEM-NREL Work on Offshore Renewable Energy

- Offshore wind energy cost and jobs analysis (CA, OR, HI)
- Marine hydrokinetic training for BOEM staff
- White paper to inform BOEM on offshore wind and fishing community interaction
- Floating wind turbine visualizations for hypothetical projects in Hawaii
- Technical analysis of offshore wind energy lease areas
NREL is surveying the potential offshore renewable energy resources in the Gulf of Mexico and quantifying the feasibility of the technologies, to inform strategic energy planning.

- Funded by BOEM Environmental Studies Program
- Geographic region – Gulf states from Mexico to Key West
Renewable energy types to be evaluated:
- Offshore wind
- Wave energy
- Tidal energy
- Ocean current energy (Loop Current)
- Ocean-based solar energy
- Ocean thermal energy conversion (OTEC)
- Deep water source cooling
- Hydrogen.

Evaluation based on resource, technology readiness and cost

Focus on State and Federal waters

After Task 1, there will be a down-select.
Task 2: Regional Economic Modeling for the Gulf

• **Part A - Geospatial Regional Economic Analysis**
  
  o Resource capacity and energy potential by state, distance from shore, and water depth
  
  o Geospatial cost variables include water depth, wind resource, sea state, substructure type, technology size, distance to port, distance to cable interconnect, and installation method
  
  o Regional Levelized Avoided Cost of Energy (LACE) and economic potential

• **Part B – Local Benefits and Supply Chain Advantages**
  
  o Integrate local benefits and challenges of deploying offshore renewable energy in the Gulf of Mexico into geo-spatial LCOE cost models
  
  o Perform analysis including supply chain and local content.
Representative offshore sites will be selected to provide site-specific physical and economic analyses for typical projects in the Gulf of Mexico region.

Cost Reduction Estimates for Two CA Sites

Offshore wind reference areas used for physical site and economic analysis in California.
Task 4: Jobs and Economic Development

• Use NREL’s jobs and economic development impacts (JEDI) model to estimate gross jobs and economic impacts of construction and operations associated with offshore wind build scenario.

• Use assumptions on supply chain and Gulf labor from Task 2. Estimate on-site, supply chain and induced jobs and economic impacts at state or regional level.
Preliminary Findings
Resource Assessment Framework

![Diagram of resource assessment framework]

## Renewable Energy Resource Limit Criteria for the Gulf of Mexico

<table>
<thead>
<tr>
<th>Technology</th>
<th>Gross Potential Limits</th>
<th>Technical Potential Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Distance From Shore</td>
<td>Water Depth</td>
</tr>
<tr>
<td>Offshore Wind</td>
<td>200 nm</td>
<td>unlimited</td>
</tr>
<tr>
<td>Wave Energy</td>
<td>200 nm</td>
<td>unlimited</td>
</tr>
<tr>
<td>Offshore Solar Photovoltaics</td>
<td>200 nm</td>
<td>unlimited</td>
</tr>
<tr>
<td>Tidal Energy</td>
<td>200 nm</td>
<td>unlimited</td>
</tr>
<tr>
<td>Ocean Current</td>
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</tr>
<tr>
<td>Ocean Thermal Energy</td>
<td>200 nm</td>
<td>unlimited</td>
</tr>
<tr>
<td>Cold Water Source Cooling</td>
<td>200 nm</td>
<td>unlimited</td>
</tr>
</tbody>
</table>
Offshore Wind Resource - Gross and Technical Potential

Gross Resource Potential

• 0 - 200 nm boundary
• No depth limit
• No wind speed filter

Technical Resource Potential

• 0 - 200 nm boundary
• Only area less than 1000 m
• Only area greater than 7 m/s
Wave Resource - Gross and Technical Potential

**Gross Resource Potential Filters**
- 0- 200 nm boundary
- No depth limit
- No wind speed filter
- Data limited to area shown

**Technical Resource Potential Filters**
- 0- 200 nm boundary
- Area less than 1000 m deep
- Wave power greater than 10 kW/m
- No wave energy resource within filters
Tidal Power Density – Florida Keys

Source: NREL MHK Atlas
https://maps.nrel.gov/mhk-atlas
Next Steps

• Finish feasibility analysis of RE technologies
• Down-select based on resource availability, technology readiness, and cost
• Conduct specific analysis for ~3 sites in Federal waters, on most viable technology
• Conduct supply chain, economic impact and jobs analysis
• Develop and disseminate outreach educational material
Thank you for your attention

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